Southern Illinois University  
Course: ET 238  
Title: Digital Fundamentals  
Semester: Fall 2013

Instructor: Dr. Garth V. Crosby  
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Office Hours: Mon, Wed, Fri: 10-12p.m. & Mon, Wed 4-5 p.m.

Required Course Text


Reference

Manufacturers’ manuals.

Course Description

This course is a study of the fundamental concepts of digital electronics design and application. Traditional approaches to the design of combinational and sequential circuits are covered. In addition, more contemporary approaches, such as using hardware design languages, are introduced.

General Objective

To master the fundamental design techniques of combinational and sequential logic circuits.

Learning Outcomes

At the end of this course students should:  
1. Be able to compare and or contrast the advantages and disadvantages of analog and digital electronics  
2. Be knowledgeable of the binary number systems and its application to digital electronics  
3. Understand the operation (truth table) of the fundamental logic gates.  
4. Be able to apply hardware and software digital design techniques in the implementation of design projects

List of Topics

1. Digital versus Analog Electronics  
2. Numerical Representation, Binary systems, codes, conversions and truth tables  
3. Boolean Algebra, Functions and Logic gates
4. Derivation and minimization of logic equations
5. Implementation of logic equations
6. Analysis and design of various combinational circuits (adders, subtractors, etc.)
7. Design of combinational network using MSI chips (multiplexers, decoders, ROM, etc.)
8. Analysis and design of sequential circuits (registers, counters, timers, etc.)
9. Applications of gates and flip-flops in the design of more complex circuits.
10. Programming programmable logic devices (PLD)

Typically, we will cover one of the above mentioned topics in one to two weeks. Some topics will require additional time.

**Class Schedule**

1. Introduction to Digital Electronics (Chapter 1)
2. Number Systems, Operation and Codes (Chapter 2)
3. Logic Gates (Chapter 3)
4. Boolean Algebra and Logic Simplification (Chapter 4)
5. Combinational Logic Analysis (Chapter 5)
6. Functions of Combinational Logic (Chapter 6)
7. Latches, Flip-Flops, and Timers (Chapter 7)
8. Counters (Chapter 8)
9. Shift Registers (Chapter 9)
10. Memory and Storage (Chapter 10)
11. Programmable Logic and Software (Chapter 11)

**Assessment (subject to change at instructor’s discretion):**

1. Homework – 10%
2. Lab - 20%
3. Project - 10%
4. Test 1 - 20% *
5. Test 2 - 20% *
6. Test 3 – 20% *
7. Test 4 - 20% *

*Best 3 of 4 tests will be used.

**Project**

All students are required to work as a group on a design project. There should be no more than two persons in a group, unless special permission is granted by the instructor. A working hardware and/or software design should be submitted at the end. In addition, a 10 minutes PowerPoint presentation will be presented by each project group in the final week of class. (*Project details will be further elaborated on in class*).
Grading

A: 90-100
B: 80-89.9
C: 70-79.9
D: 60-69.9
F: below 60

Class Policies

i) Class attendance is required and class role will be randomly taken. Attendance data will be used to determine border-line grade adjustments.

ii) In exceptional cases a make up test will be given to a student that complies with all of the following:

1. Call (or email) instructor **BEFORE** test time to notify of problem.
2. Bring written proof to instructor.

The following situations apply for a make-up:

1. The make-up test will be of more complexity and more exhaustive than the original test missed and will include all materials up to the date of the make-up test.
2. Only one test can be missed; therefore, only one make-up test will be given.
3. The time and place of this make-up test will be announced in advance, and you must sign up with the instructor a minimum of one week in advance.

Emergency Procedures:

Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. Because some health and safety circumstances are beyond our control, we ask that you become familiar with the SIUC Emergency Response Plan and Building Emergency Response Team (BERT) program. Emergency response information is available on posters in building on campus, available on the BERT’s website at [www.bert.siu.edu](http://www.bert.siu.edu), Department of Public Safety’s website [www.dps.siu.edu](http://www.dps.siu.edu) (disaster drop down) and in the Emergency Response Guidelines pamphlet. Know how to respond to each type of emergency.

Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. **It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency.** The Building Emergency Response Team will provide assistance to your instructor in evacuating the building or sheltering within the facility.